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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/587,029	07/24/2006	Masahiro Orita	Q96124	9255

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WASHINGTON, DC 20037-3213

EXAMINER	
GREEN, TRACIE Y	
ART UNIT	PAPER NUMBER
2879	

NOTIFICATION DATE	DELIVERY MODE
11/20/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/587,029	ORITA ET AL.	
	Examiner	Art Unit	
	Tracie Green	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 October 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *06/19/2009 and 10/29/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Receipt is acknowledged of applicant's amendment filed 10/29/2009. Claims 1-13 are pending and an action on the merits is as follows.

2. Applicant's amendments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 4, and 6-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bulovic et al. (US 2004/0023010 A1).

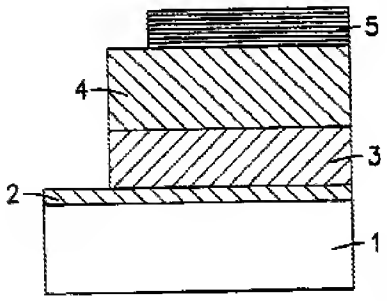

FIG. 1

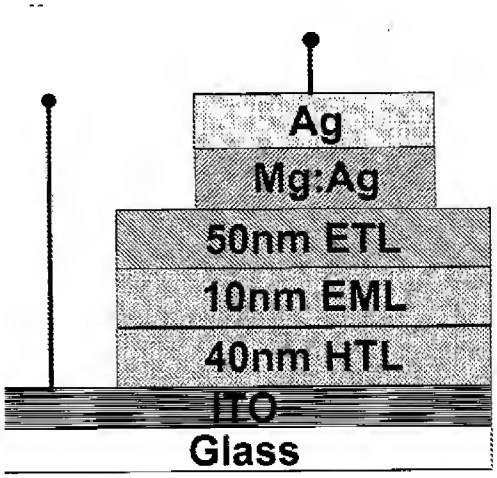

FIG. 2E

Regarding claim 1, Bulovic teaches (figures 1-9) (Examiner has reproduced Figures 1 and 2e for applicant's reference) a quantum dot-dispersed light emitting device comprising (¶36 and 39) *(Examiner note : In the disclosure prior art refers to nano-particles, -dots and -crystal which behave as quantum dots; furthermore figures 3-6, represent the nanocrystals by "QD" signifying their behavior)* : a substrate (1); an electron injection electrode (5, Fig 2e, Mg); a hole injection electrode (2, Fig 2. ITO); and an inorganic light emitting layer (EML) disposed so as to be in contact with both the electrodes (1,2),wherein the inorganic light emitting layer (EML) includes an ambipolar inorganic semiconductor material and nanocrystals ((¶33, lines 1-3 and ¶39, lines 7-12) *(Examiner note: prior art discloses GaP, GaAs, GaSb, GaSe, InN, InP with CdS, CdSe, CdTe at the core)* dispersed as luminescent centers (¶33, lines 1-3) in the ambipolar inorganic semiconductor material (¶39, lines 7-12) , and is configured without having, at the interface with the electron injection electrode and/or the hole injection electrode, epitaxial relation therewith (¶48, lines teaches dispersion in matrix material)

Regarding claim 4, Bulovic teaches wherein the inorganic light emitting layer comprises a ZnS type semiconductor phase (¶39, lines 7-12) (*prior art reveal this can be used)*

Regarding claim 6, Bulovic teaches wherein the nanocrystals contain any of InP, GaAs, and GaP as a main component (¶39, lines 7-12) *prior art reveal these can be used)*

Regarding claim 8, Bulovic teaches wherein the substrate is a glass substrate (1, ¶28, lines 1-3)

Regarding claim 9, Bulovic teaches wherein the electron injection electrode (5) and the hole injection electrode (2) are disposed spaced apart from each other, with the inorganic light emitting layer (EML) interposed there between, in a lamination on the substrate (1).

Regarding claim 10, Bulovic teaches wherein the electron injection electrode (5) and the hole injection electrode (2) are disposed spaced apart from each other in a plane on the substrate (1). (*Examiner note: in they are spaced apart in the y-plane and x plane*

Regarding claims 12 and 13, Bulovic teaches the light emitting device set forth above. Bulovic does not explicitly teach display apparatus or illumination comprising the quantum dot-dispersed light emitting device. Rather he teaches the benefits of having such a device in optoelectronic devices. One of ordinary skill in the lot could utilize the device of Bulovic in a display device or illumination device in order to provide a lamp with lower driving voltage, brighter image, and improved durability.

4. Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bulovic et al. (US 2004/0023010 A1) in view of Danek et al. ("Electrospray Organometallic vapor deposition- A novel technique for preparation of Quantum Dot composites").

Regarding claims 2-3, Bulovic teaches the light emitting device set forth above (see rejection claim 1). Bulovic is silent regarding wherein the ambipolar inorganic semiconductor material is an amorphous semiconductor phase (Claim 2) or a polycrystal semiconductor phase (Claim 3).

In the same field of endeavor of semiconductor light-emitting devices, Danek et al. teaches wherein the ambipolar inorganic semiconductor material is an amorphous semiconductor phase or a polycrystal semiconductor phase (Abstract, lines 4-7) in order to provide a device with improved emission and light efficiency.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the light-emitting device of Bulovic wherein the ambipolar inorganic semiconductor material is an amorphous semiconductor phase or a polycrystal semiconductor phase (Abstract, lines 4-7) in order to provide a device with improved emission and light efficiency as taught by Danek et al.

5. Claims 5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bulovic et al. (US 2004/0023010 A1) in view Mensz (US 5,422,902)

Regarding claims 5 and 7, Bulovic teaches the light emitting device set forth above (see rejection claim 1). Bulovic is silent regarding wherein the inorganic light emitting layer (claim 4) or the hole injection electrode (claim 7) comprises $Zn_pM_{1-p}S_xSe_yTe_{1-x-y}$ (where $0 \leq x, y, x+y \leq 1$, $0<p\leq 1$, M: alkaline-earth metal, Cd).

In the same field of endeavor of semiconductor light-emitting devices, Mensz teaches wherein the inorganic light emitting layer (Column 3, lines 1-5) $Zn_pM_{1-p}S_xSe_yTe_{1-x-y}$ (where $0 \leq x, y, x+y \leq 1$, $0<p\leq 1$, M: alkaline-earth metal, Cd) in order to provide a device with decreased operating voltage and allowing for the use of a thinner cladding layer. Mensz does not explicitly teach the hole injection electrode comprises $Zn_pM_{1-p}S_xSe_yTe_{1-x-y}$ (where $0 \leq x, y, x+y \leq 1$, $0<p\leq 1$, M: alkaline-earth metal, Cd).

However, one of ordinary skill in the art at the time of the invention could modify the light emitting device of Bulovic wherein the inorganic light emitting layer or the hole injection electrode comprises $Zn_pM_{1-p}S_xSe_yTe_{1-x-y}$ (where $0 \leq x, y, x+y \leq 1$, $0<p\leq 1$, M: alkaline-earth metal, Cd) as taught by Mensz; wherein the inorganic light emitting layer or the hole injection electrode comprises $Zn_pM_{1-p}S_xSe_yTe_{1-x-y}$ (where $0 \leq x, y, x+y \leq 1$, $0<p\leq 1$, M: alkaline-earth metal, Cd) in order to provide a device with decreased operating voltage and allowing for the use of a thinner cladding layer as taught by Mensz.

6. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bulovic et al. (US 2004/0023010 A1) in view Hayashi et al. (US 2002/0167280 A1).

Bulovic teaches the light emitting device set forth above (see rejection claim 1). Bulovic is silent regarding wherein the electron injection electrode and the hole injection electrode are disposed spaced apart from each other in a plane on the substrate.

In the same field of endeavor of light emitting devices, Hayashi et al. (Figure 15, 16) teaches wherein the electron injection electrode (5a) and the hole injection electrode (5b) are disposed spaced apart from each other in a plane on the substrate in order to provide of a device wherein improving reliability of hole and electron injection, the luminance of a light-emitting device, and a light-emitting display can be improved.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the light-emitting device of Bulovic wherein the electron injection electrode and the hole injection electrode are disposed spaced apart from each other in a plane on the substrate in order to provide of a device wherein improving

reliability of hole and electron injection, the luminance of a light-emitting device, and a light-emitting display can be improved as taught by Hayashi et al.

7. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bulovic et al (US 2004/0023010 A1) in view Koyama et al. (US 2003/0094897 A1).

Bulovic teaches the light emitting device set forth above (see rejection claim 1). Bulovic is silent regarding wherein a gate electrode is disposed between the electron injection electrode and the hole injection electrode.

In the same field of endeavor of light emitting devices, Koyama et al. teaches (Figure 6) wherein a gate electrode (70) is disposed between the electron injection electrode (20) and the hole injection electrode (40) in order to provide a device where emitted light can be obtained with high efficiency and with high directionability by selectively controlling the drive voltage (Paragraph 28)

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the light-emitting device of Bulovic wherein a gate electrode is disposed between the electron injection electrode and the hole injection electrode in order to provide a device where emitted light can be obtained with high efficiency and with high directionability by selectively controlling the drive voltage as taught by Koyama et al.

Response to Arguments

8. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracie Green whose telephone number is (571)270-3104. The examiner can normally be reached on Mon-Thurs 7:00am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on 571-272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

/Tracie Green/
Examiner, Art Unit 2879

/Sikha Roy/
Primary Examiner, Art Unit 2879